Iron complexes with thiol-containing ligands as spin traps for NO in biosystems

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The possible pitfalls and artefacts will be considered which may be encountered when using Fe^{2+} complexes with exogenous or endogenous thiol - containing ligands (dithiocarbamates or cysteine, respectively) as spin traps for NO in living systems. Redox activity of both Fe-dithiocarbamates and their EPR detectable nitroso adducts, mononitrosyl iron complexes (MNIC) with dithiocarbamates makes the pitfalls when NO detecting with the first type of NO traps. The analysis demonstrates that even when oxidized into predominate Fe^{3+} state the Fe-dithiocarbamates retain capacity to bind NO and can subsequently be reduced to paramagnetic MNIC-dithiocarbamates. So the redox activity of Fe-dithiocarbamates does not interfere with NO detection by the method in living system. The capacity of paramagnetic MNIC-dithiocarbamates to react efficiently with superoxide or peroxinitrite make other pitfalls which are characteristics of the method. Due to these reactions the accumulation of MNIC complexes in living systems has rather a dynamic character, which is determined by the rate of the MNIC-dithiocarbamate generation and the rate of its transformation into an EPR silent form. Under these circumstances, the new method, called ABC method was developed to estimate the amount of endogenous MNIC-dithiocarbamate complexes formed by NO trapping. The method sharply increases the efficiency of NO detection and quantification in the systems by Fe-dithiocarbamate approach [1]. The formation of another type paramagnetic nitrosyl iron complexes with endogenous cysteine ligand (low molecular or bound with protein dinitrosyl iron complexes,DNIC) is also interfere with superoxide or peroxynitrite. However the addition of exogenous MNIC-dithiocarbamate complex as a superoxide or peroxynitrite scavenger results in paramagnetic DNIC stabilization.